UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1 53(b))

Attorney Docket No.	70-38-22	Total Pages	35
First Named Inventor or Application Identifier	Barin Geoffry Haskell		
Express Mail Label No.	EM164542510US		

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents

ADDRESS TO: **Assistant Commissioner for Patents, Box Patent Application, Washington, D.C. 20231**

1. ☒ Fee Transmittal Form *(submit an original, and a duplicate for fee processing)*
2. ☒ Specification [Total Pages 19] (preferred arrangement set forth below)
   - Descriptive title of invention
   - Cross References to Related Applications
   - Statement Regarding Fed sponsored R&D
   - Reference to Microfiche Appendix
   - Background of the Invention
   - Brief Summary of the Invention
   - Brief Description of the Drawings(if filed)
   - Detailed Description
   - Claim(s)
   - Abstract of the Disclosure
3. ☒ Drawing(s)(35 USC 113) [Total Sheets 4]
4. Oath or Declaration [Total Pages 4]
   a. ☒ Newly executed (original or copy)
   b. ☐ Copy from a prior application(37 CFR 1 63(d)) *(for continuation/divisional with Box 17 completed)* ***[Note Box 5 below]***
      i. ☐ DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 163(d)(2) and 1 33(b)
5. ☐ Incorporation by reference(useable if Box 4b is checked) The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference herein
6. ☐ Microfiche Computer Program *(Appendix)*
7. ☐ Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all necessary)*
   a. ☐ Computer Readable Copy
   b. ☐ Paper Copy(identical to computer copy)
   c. ☐ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. ☒ Assignment Papers(cover sheet & document(s))
9. ☐ 37 CFR 3.73(b)Statement ☐ Power of Attorney
10. ☐ English Translation Document *(if applicable)*
11. ☐ Information Disclosure Statement(IDS)/PTO-1449 ☐ Copies of IDS Citations
12. ☐ Preliminary Amendment
13. ☒ Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*
14. ☐ Small Entity ☐ Statement filed in prior application, Statement(s) Status still proper and desired
15. ☐ Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
16. ☒ Other : Associate Power of Attorney

17. **If a CONTINUING APPLICATION,** *check appropriate box and supply the requisite information:*
☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior Application No:

18. CORRESPONDENCE ADDRESS

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19. SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

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SIGNATURE	Stephen M. Gurey	DATE	05/06/1998

"Express Mail" Mailing Label Number EM164542510US Date of Deposit 05/06/1998

I hereby certify that this Application Is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Assistant Commissioner of Patents, Washington D.C. , 20231

William Olson
(Printed Name of Person Mailing Paper)

William Olson
(Signature of Person Mailing Paper)

Please type a plus sign(+) inside this box→ [+]

PTO/SB/17 Modified 02-98 AT&T Corp.

FEE TRANSMITTAL

Patent Fees are subject to annual revision on October 1
These are the fees effective October 1, 1997
Small Entity payments must be supported by a small entity Statement, otherwise, large entity fees must be paid See Forms PTO/SB/09-12

TOTAL AMOUNT OF PAYMENT	($)1272.00

Complete if Known	
Application Number	
Filing Date	
First Named Inventor	Barin Geoffry Haskell
Examiner Name	
Group/Art Unit	
Attorney Docket No.	70-38-22

METHOD OF PAYMENT (check one)

1. The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to:

Deposit Account Number: 01-2745

Deposit Account Name: AT&T CORP.

☒ Charge Any Additional Fee Required Under 37 CFR 1 16 and 1 17 ☐ Charge the Issue Fee Set in 37 CFR 1 18 at the Mailing of the Notice of Allowance

2. ☐ Payment Enclosed: ☐ Check ☐ Money Order ☐ Other

FEE CALCULATION

1. FILING FEE

Large Fee Code	Entity Fee($)	Fee Description	Fee Paid
101	790	Utility Filing Fee	790.00
106	330	Design Filing Fee	
107	540	Plant Filing Fee	
108	790	Reissue Filing Fee	
114	150	Provisional Filing Fee	
		SUBTOTAL (1) ($)	790.00

2. CLAIMS

		Extra Claims		Fee from below		Fee Paid
Total Claims	27 -20=	7	X	22.00	=	154.00
Independent Claims	7 -3 =	4	X	82.00	=	328.00
Multiple Dependent Claims					=	0

Large Fee Code	Entity Fee($)	Fee Description
103	22	Claims in excess of 20
102	82	Independent Claims in excess of 3
104	270	Multiple Dependent Claims
109	82	Reissue independent claims over original patent
110	22	Reissue claims in excess of 20 and over original patent
	SUBTOTAL (2) ($)	482.00

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Fee Code	Entity Fee($)	Fee Description	Fee Paid
105	130	Surcharge - late filing fee or oath	
127	50	Surcharge - late provisional filing fee or cover sheet	
139	130	Non-English specification	
147	2520	For filing a request for reexamination	
112	920*	Requesting publication of SIR prior to Examiner action	
113	1840*	Requesting publication of SIR after to Examiner action	
115	110	Extension for reply within first month	
116	400	Extension for reply within second month	
117	950	Extension for reply within third month	
118	1510	Extension for reply within fourth month	
128	2060	Extension for reply within fifth month	
119	310	Notice of Appeal	
120	310	Filing a brief in support of an appeal	
121	270	Request for oral hearing	
138	1510	Petition to institute a public use proceeding	
140	110	Petition to revive - unavoidable	
141	1320	Petition to revive - unintentional	
142	1320	Utility issue fee (or reissue)	
143	450	Design issue fee	
144	670	Plant issue fee	
122	130	Petitions to the Commissioner	
123	50	Petitions related to provisional applications	
126	240	Submission of Information Disclosure Statement	
581	40	Recording each patent assignment per property(times number of properties)	
146	790	Filing a submission after final rejection(37 CFR 1.129(a))	
149	790	For each additional invention to be examined (37 CFR 1.129(b))	
Other fee (specify)			
Other fee (specify)			

* Reduced by Basic Filing Fee Paid — SUBTOTAL(3)

SUBMITTED BY					Complete (if applicable)	
Typed or Printed Name	Stephen M. Gurey				Reg Number	27336
Signature	Stephen M. Gurey	Date	5/6/1998	Deposit Account User ID		

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HASKELL 70-38-22

METHOD AND APPARATUS TO PRIORITIZE VIDEO INFORMATION DURING CODING AND DECODING

CROSS REFERENCE TO RELATED APPLICATIONS

The subject matter of the present application is related to the subject matter of U.S. patent application Serial Number 08/986,118 entitled "Video Objects Coded by Keyregions" to Barin Geoffry Haskell, Atul Puri and Robert Lewis Schmidt, and filed on December 5, 1997, the entire disclosure of which is hereby incorporated by reference.

FIELD OF THE INVENTION

The invention relates to video coding. More particularly, the invention relates to a method and apparatus to prioritize video information during coding and decoding.

BACKGROUND OF THE INVENTION

Audiovisual information, such as a video of a person speaking, can be converted into a digital signal and transmitted over a communications network. The digital signal can then be converted back into audiovisual information for display. At the time of this writing, the Moving

Picture Experts Group (MPEG) of the International Standardization Organization (ISO) is developing a new standard, known as MPEG-4, for the encoding of audiovisual information that will be sent over a communications network at a low transmission rate, or "bitrate." When complete, MPEG-4 is expected to enable interactive mobile multimedia communications, video phone conferences and a host of other applications.

These applications will be achieved by coding visual objects, which include natural or synthetic video objects, into a generalized coded bitstream representing video information, referred to as a "visual" bitstream. A bitstream that contains both visual and audio information is also referred to as a "systems" bitstream.

A video object is a specific type of natural visual object, and is further composed of layers called Video Object Layers (VOLs). Each VOL is composed of Video Object Planes (VOPs), which can be thought of as snapshots in time of a VOL. The advent of video objects and VOPs in video coding permits significant coding savings by selectively apportioning bits among parts of the frame that require a relatively large number of bits and other parts that require a relatively small number of bits. VOPs also permit additional functionality, such as object manipulation.

As an example, Fig. 1 illustrates a frame 100 for coding that includes the head and shoulders of a narrator 110, a logo 120 suspended within the frame 100 and a background 130. The logo 120 may be static, having no motion and no animation. In such a case, bit savings may be realized by coding the logo 120 only once. For display, the coded logo 120 could be decoded and displayed continuously from the single coded representation. Similarly, it may be desirable

to allocate fewer bits for coding a semi-static or slowly moving background 130. Bit savings realized by coding the logo 120 and background 130 at lower rates may permit coding of the narrator 110 at a higher rate, where the perceptual significance of the image may reside. VOPs are suited to such applications. FIG. 1 also illustrates the frame 100 broken into three VOPs. By convention, a background 130 is generally assigned VOPØ. The narrator 110 and logo 120 may be assigned VOP1 and VOP2, respectively. Of course, other number schemes can also be used to label these regions.

Note that not all elements within a VOP will merit identical treatment. For example, certain areas within a VOP may require animation, whereas others may be relatively static. Consider the example of VOP1 in FIG. 1. The perceptually significant areas of VOP1 center around the facial features of the figure. The clothes and hair of the narrator 110 may not require animation to the same extent that the facial features do. Accordingly, as disclosed in U.S. patent application Serial Number 08/986,118 entitled "Video Objects Coded by Keyregions," keyregions may be used to emphasize certain areas of a VOP over others.

The object based organization of MPEG-4 video, in principle, will provide a number of benefits in error robustness, quality tradeoffs and scene composition. The current MPEG-4 standards, however, lack a number of tools, and their associated syntax and semantics, to fully and flexibly exploit this object based organization. In particular, there is no way to identify an element, such as a visual object, VOL or keyregion, as more important than other elements of the same type.

For example, a higher degree of error robustness would be achieved if a higher priority could be assigned to the foreground speaker object as compared to a less relevant background object. If an encoder or decoder can only process a limited number or objects, it would be helpful to have the encoder or decoder know which objects should be processed first.

Moreover, because the MPEG-4 system will offer scene description and composition flexibility, reconstructed scenes would remain meaningful even when low priority objects are only partially available, or even totally unavailable. Low priority objects could become unavailable, for example, due to data loss or corruption.

Finally, in the event of channel congestion, identifying important video data would be very useful because such data could be scheduled for delivery ahead of less important video data. The remaining video data could be scheduled later, or even discarded. Prioritization would also be useful for graceful degradation when bandwidth, memory or computational resources become limited.

In view of the foregoing, it can be appreciated that a substantial need exists for a method and apparatus to prioritize video objects when they are coded, and solving the other problems discussed above.

SUMMARY OF THE INVENTION

The disadvantages of the art are alleviated to a great extent by a method and apparatus to prioritize video information during coding and decoding. To extract further benefits from the

object based organization of coded, visual or video data, the present invention associates priorities with visual objects, VOLs, and keyregions. The priorities for visual objects and VOLs can be made optional, if desired. Those for keyregions can be made mandatory, because the keyregions themselves are optional.

According to an embodiment of the present invention, video information is received and an element of the video information, such as a visual object, VOL or keyregion, is identified. A priority is assigned to the identified element and the video information is encoded into a bitstream, such as a visual bitstream, including an indication of the priority of the element. The priority information can then be used when decoding the bitstream to reconstruct the video information.

With these and other advantages and features of the invention that will become hereinafter apparent, the nature of the invention may be more clearly understood by reference to the following detailed description of the invention, the appended claims and to the several drawings attached herein.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a video frame and video objects from the frame to be coded according to the present invention.

FIG. 2 is a block diagram of an embodiment of the present invention.

FIG. 3 illustrates the operation of a encoder according to an embodiment of the present invention.

FIG. 4 illustrates the operation of a decoder according to an embodiment of the present invention.

DETAILED DESCRIPTION

The present invention is directed to a method and apparatus to prioritize video information during coding and decoding. Referring now in detail to the drawings wherein like parts are designated by like reference numerals throughout, there is illustrated in FIG. 2 a block diagram of an embodiment of the present invention. An encoder 210 receives, through an input port, a video signal representative of a frame or frames to be coded. The video signal is sampled and organized into macroblocks which are spatial areas of each frame. The encoder 210 codes the macroblocks and outputs an encoded bitstream, through an output port, to a channel 220. The bitstream contains groupings of macroblocks organized and coded as VOPs. The channel 220 may be a radio channel or a computer network. Instead of the communication channel 220, the encoded bitstream could be sent to some storage media, such as a memory or a magnetic or optical disk (not shown in FIG. 2). A decoder 230 retrieves the bitstream through an input port from the channel 220, or from the storage medium, and reconstructs a video signal. The reconstructed video signal can be output through an output port for display.

The encoder 210 defines a VOP in the bitstream by generating a VOP header. VOP headers define the position and size of the VOP. It also indicates the presence of shape information. After decoding a VOP header, the decoder 230 can determine how many macroblocks are contained in the VOP. The decoder 230 also knows the video objects, VOLs and keyregions that comprise the image.

According to the present invention, each video object, VOL and keyregion can be assigned a priority to indicate its significance. In case of channel errors, congestion or limitation of bandwidth, memory or processor resources, preference can be given to video data elements with high priority.

The assignment of priorities to video objects and VOLs is included directly into the video bitstream. In addition, priorities could be assigned to specific VOPs or to types of VOPs. In fact, VOP types themselves tend to a form of automatic prioritization. For example, VOPs that are coded using motion compensated prediction from past and/or future reference VOPs, known as bidirectionally predictive-coded VOPs (B-VOPs), are noncausual and do not contribute to error propagation. Thus, B-VOPs can be assigned a lower priority and perhaps can even be discarded in case of severe errors. On the other hand, VOPs coded using information only from themselves, known as an intra-coded VOPs (I-VOPs), may be assigned the highest priority. In this way, the implicit nature of priorities for VOP types can be exploited. Priorities can also be assigned, however, to important regions within each VOP. This can be accomplished by assigned priorities to keyregions.

The assignment of priorities to various types of coded video data, such as visual objects, VOLs, VOPs or keyregions, can be handled either during or after the encoding process performed by the encoder 210, so long as the coded bitstream carries the priority information over the channel 220. The priority information for video objects, VOLs and VOPs can be made optional, if desired. It should be noted that priorities can be implemented for any combination of these elements, depending on the application. The priority information for keyregions can be made mandatory, because the use of a keyregion itself is considered optional.

FIG. 3 illustrates the operation of the encoder 210 according to an embodiment of the present invention. After beginning at step 300, video information, such as a video signal, is received at step 310. Priorities are assigned to the visual object elements in the video signal at step 320. The visual object priority information is assumed to be optional. When present, priority information is carried by a specific codeword in the visual bitstream or included as part of the object descriptor in a systems bitstream. Priorities are assigned to VOLs at step 330, VOPs at step 335, and to keyregions at step 340, also using specific codewords in the visual bitstream. The VOL priority information is assumed to be optional. When present, the priority information is carried by a specific codeword in the visual bitstream. The keyregion priority information is also carried by a specific codeword in the visual bitstream, in the keyregion class. At step 350 the encoder 210 transmits the encoded bitstream, including the priority information, over the channel 220 and the process ends at step 390.

If desired, such a method could allow the encoder 210 to transmit high priority elements in the bitstream first, and even discard lower priority items if required. Blank information, older

information or extrapolated information could be used in place of the discarded lower priority items. Such schemes could provide a graceful degradation of image quality in the event of limited bandwidth or limited memory or computational power. Such limitations could occur at the encoder 210, along the channel 220 or at the decoder 230.

Similarly, FIG. 4 illustrates the operation of the decoder 230 according to an embodiment of the present invention. After beginning at step 400, an encoded bitstream is received at step 410 from the channel 220. Visual objects are decoded from the bitstream based on the priority information, if any, contained in a specific codeword in the visual bitstream, or included as part of the object descriptor in a systems bitstream, at step 420. VOLs are decoded from the bitstream based on the priority information, if any, carried by a specific codeword in the visual bitstream at step 430. VOPs are similarly decoded from the bitstream based on priority at step 435. Finally, keyregions are decoded from the bitstream based on the priority information contained in a specific codeword in the visual bitstream, in the keyregion class, at step 440. At step 450 the decoder 230 outputs the reconstructed video signal and the process ends at step 490. As with the encoder 210, such a method could let the decoder 230 first decode those elements that have the highest priority.

An embodiment of the present invention, including syntax additions and changes, and related semantics, that can be used to implement the various priorities discussed above in the ongoing draft of the MPEG-4 specification is provided below.

Visual Object (or Video Object) Class Syntax Modification

The following structure can be used when assigning a priority to a visual object:

```
is_visual_object_identifier                1
if (is_visual_object_identifier) {
        visual_object_priority             3
}
```

The term is_visual_object_identifier represents a single bit code which when set to "1" indicates that priority is specified for the visual object. When set to "0," priority does not need to be specified. The term visual_object_priority represents a three bit code which specifies the priority of the visual object. It takes values between 1 and 7, with 1 representing the highest priority and 7 the lowest priority. The value of zero is reserved.

VOL Class Syntax Modification

The following structure can be used when assigning a priority to a VOL:

```
is_video_object_layer_identifier           1
if (is_video_object_layer_identifier) {
        video_object_layer_priority        3
}
```

The term is_video_object_layer_identifier represents a single bit code which when set to "1" indicates that priority is specified for the video object layer. When set to "0," priority does not need to be specified. The term video_object_layer_priority represents a three bit code which specifies the priority of the video object layer. It takes values between 1 and 7, with 1 representing the highest priority and 7 the lowest priority. The value of zero is reserved.

VOP Class Syntax Modification

The following structure can be used when assigning a priority to a VOP:

```
is_video_object_plane_identifier          1
if (is_video_object_plane_identifier) {
        video_object_plane_priority       3
}
```

The term is_video_object_plane_identifier represents a single bit code which when set to "1" indicates that priority is specified for the video object plane. When set to "0," priority does not need to be specified. The term video_object_plane_priority represents a three bit code which specifies the priority of the video object plane. It takes values between 1 and 7, with 1 representing the highest priority and 7 the lowest priority. The value of zero is reserved.

Keyregion Class Syntax Addition

The following structure can be used when assigning a priority to a keyregion:

```
keyregion_priority                        3
```

The term keyregion_priority represents a three bit code which specifies the priority of the keyregion. It takes values between 1 and 7, with 1 representing the highest priority and 7 the lowest priority. The value of zero is reserved.

As is known in the art, the methods described above can be performed by hardware, software, or some combination of software and hardware. When performed by software, the methods may be executed by a processor, such as a general purpose computer, based on instructions stored on a medium. Examples of a medium that stores instructions adapted to be

executed by a processor include a hard disk, a floppy disk, a Compact Disk Read Only Memory (CD-ROM), flash memory, and any other device that can store digital information. If desired, the instructions can be stored on the medium in a compressed and/or encrypted format. As used herein, the phrase "adapted to be executed by a processor" is meant to encompass instructions stored in a compressed and/or encrypted format, as well as instructions that have to be compiled or installed by an installer before being executed by the processor.

At the time of this writing, the MPEG-4 video standard is being drafted. The priority coding scheme of the present invention has been proposed for integration into the MPEG-4 video standard. Although various embodiments are specifically illustrated and described herein, it will be appreciated that modifications and variations of the present invention are covered by the above teachings and within the purview of the appended claims without departing from the spirit and intended scope of the invention. For example, although priority levels from 1 to 7 have been used to illustrate the present invention, it can be appreciated that other levels of priority will also fall within the scope of the invention. Moreover, the present invention can be used in coding schemes besides the MPEG-4 system. Specifically, the present invention can be used whenever video information with elements having different priorities is to be encoded into a bitstream or decoded from a bitstream.

What is claimed is:

1. A method of encoding video information, comprising the steps of:

receiving the video information;

identifying an element of the video information;

assigning a priority to the element; and

encoding the video information into a bitstream, including an indication of the priority of the element.

2. The method of claim 1, wherein said step of encoding is performed to encode the video information into a bitstream for low bitrate transmission.

3. The method of claim 1, wherein said step of encoding is performed according to the MPEG-4 standard.

4. The method claim 1, wherein the element is a visual object.

5. The method of claim 1, wherein the element is a video object layer.

6. The method of claim 1, wherein the element is a video object plane.

7. The method of claim 1, wherein the element is a keyregion.

8. The method of claim 1, wherein said step of assigning a priority to the element, and including the indication of the priority of the element in the encoded bitstream, is optional.

9. The method of claim 1, wherein the bitstream is a visual bitstream and the indication of the priority of the element is carried by a specific codeword in the visual bitstream.

10. The method of claim 1, wherein the bitstream is a systems bitstream and the indication of the priority of the element is included as part of an object descriptor in the systems bitstream.

11. The method of claim 1, wherein said step of assigning a priority is performed based on the importance of the information contained in the element.

12. The method of claim 1, wherein said step of encoding is performed for elements having a high priority before being performed for elements having a low priority.

13. The method of claim 1, wherein said step of encoding is not performed for elements having a low priority.

14. The method of claim 1, further comprising the step of:

transmitting the bitstream, wherein information related to elements having a high priority is transmitted before information related to elements having a low priority.

15. A method of decoding an encoded bitstream, comprising the steps of:

receiving the encoded bitstream;

identifying a first element and a second element in the encoded bitstream, the first element having a first priority and the second element having a second priority lower than the first priority; and

decoding the first element to reconstruct video information contained in the bitstream.

16. The method claim 15, wherein the first and second elements are visual objects.

17. The method of claim 15, wherein the first and second elements are video object layers.

18. The method of claim 15, wherein the first and second elements are video object planes.

19. The method of claim 15, wherein the first and second elements are keyregions.

20. The method of claim 15, wherein the bitstream is a visual bitstream and the indication of the priority of the element is carried by a specific codeword in the visual bitstream.

21. The method of claim 15, wherein the bitstream is a systems bitstream and the indication of the priority of the element is included as part of an object descriptor in the systems bitstream.

22. The method of claim 15, further comprising the step of:

decoding the second element to reconstruct video information contained in the bitstream.

23. A bitstream representing video information, the bitstream produced by the process of:

receiving the video information;

identifying an element of the video information;

assigning a priority to the element; and

generating data representative of the video information, including an indication of the priority of the element.

24. An apparatus for encoding video information, comprising:

an input port configured to receive the video information;

an encoding unit coupled to said input port, said encoding unit being configured to identify an element of the video information, assign a priority to the element, and encode the video information into a bitstream, including an indication of the priority of the element; and

an output port coupled to said encoding unit, said output port being configured to output the encoded bitstream.

25. An apparatus for decoding an encoded bitstream, comprising:

an input port configured to receive the encoded bitstream;

a decoding unit coupled to said input port, said decoding unit being configured to identify a first element and a second element in the encoded bitstream, the first element having a first priority and the second element having a second priority lower than the first priority, and decode the first element to reconstruct video information contained in the encoded bitstream; and

an output port coupled to said decoding unit, said output port being configured to output the reconstructed video information.

26. A medium that stores instructions adapted to be executed by a processor to perform the steps of:

receiving information to be encoded;

identifying an element of the video information;

assigning a priority to the element; and

encoding the video information into a bitstream, including an indication of the priority of the element.

27. A medium that stores instructions adapted to be executed by a processor to perform the steps of:

receiving an encoded bitstream;

identifying a first element and a second element in the encoded bitstream, the first element having a first priority and the second element having a second priority lower than the first priority; and

decoding the first element to reconstruct video information contained in the bitstream.

ABSTRACT OF THE DISCLOSURE

A method and apparatus prioritizing video information during coding and decoding. Video information is received and an element of the video information, such as a visual object, video object layer, video object plane or keyregion, is identified. A priority is assigned to the identified element and the video information is encoded into a bitstream, such as a visual bitstream encoded using the MPEG-4 standard, including an indication of the priority of the element. The priority information can then be used when decoding the bitstream to reconstruct the video information.

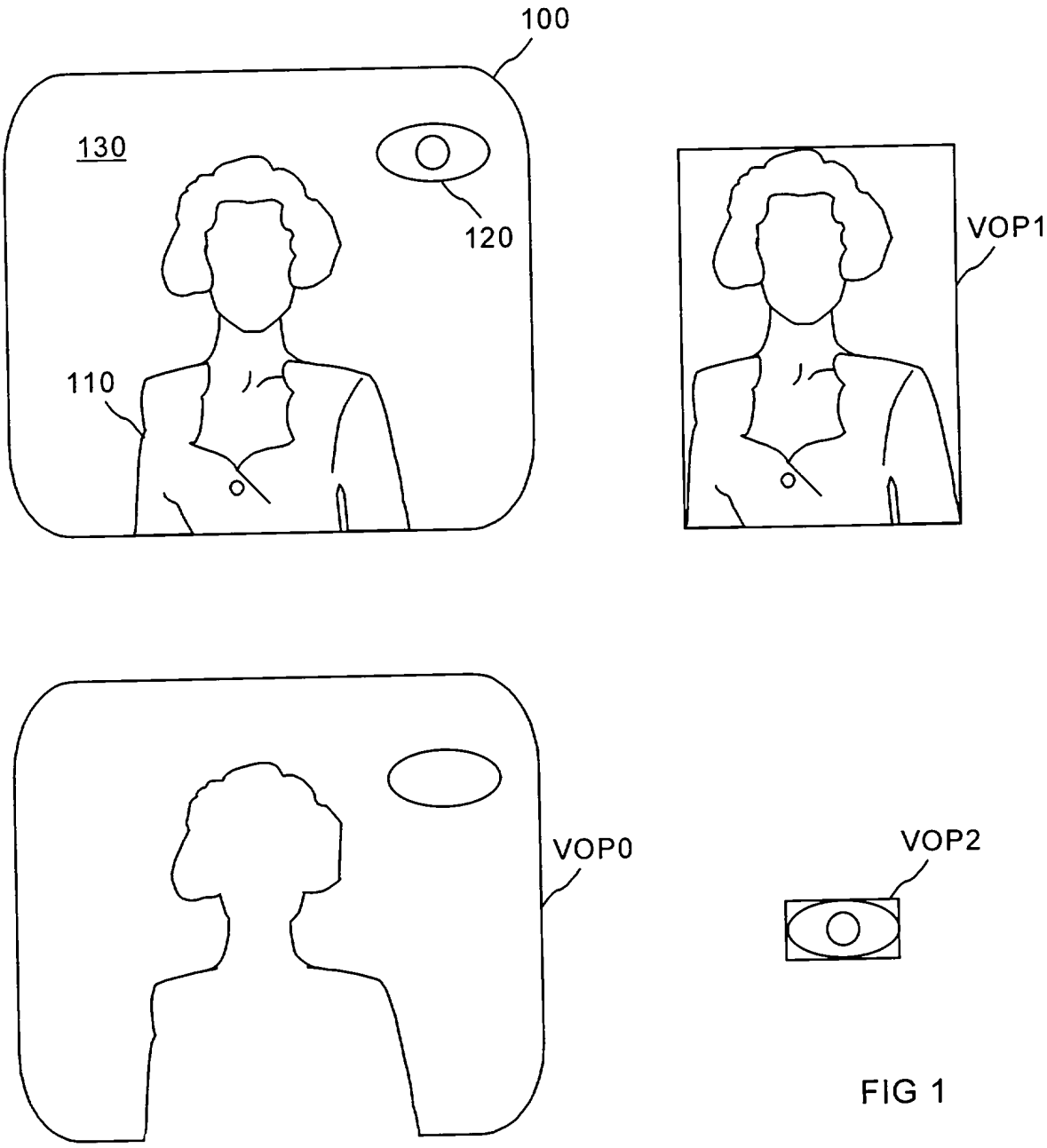

FIG 1

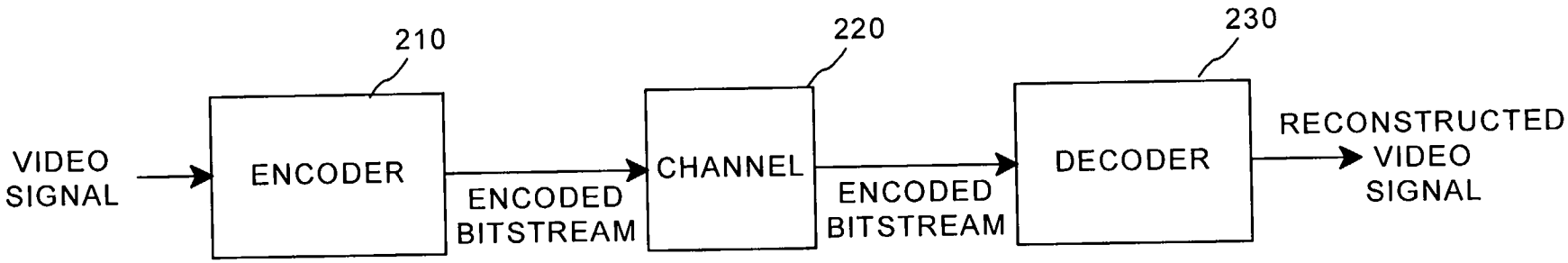
210
220
230
VIDEO SIGNAL
ENCODER
ENCODED BITSTREAM
CHANNEL
ENCODED BITSTREAM
DECODER
RECONSTRUCTED VIDEO SIGNAL

FIG. 2

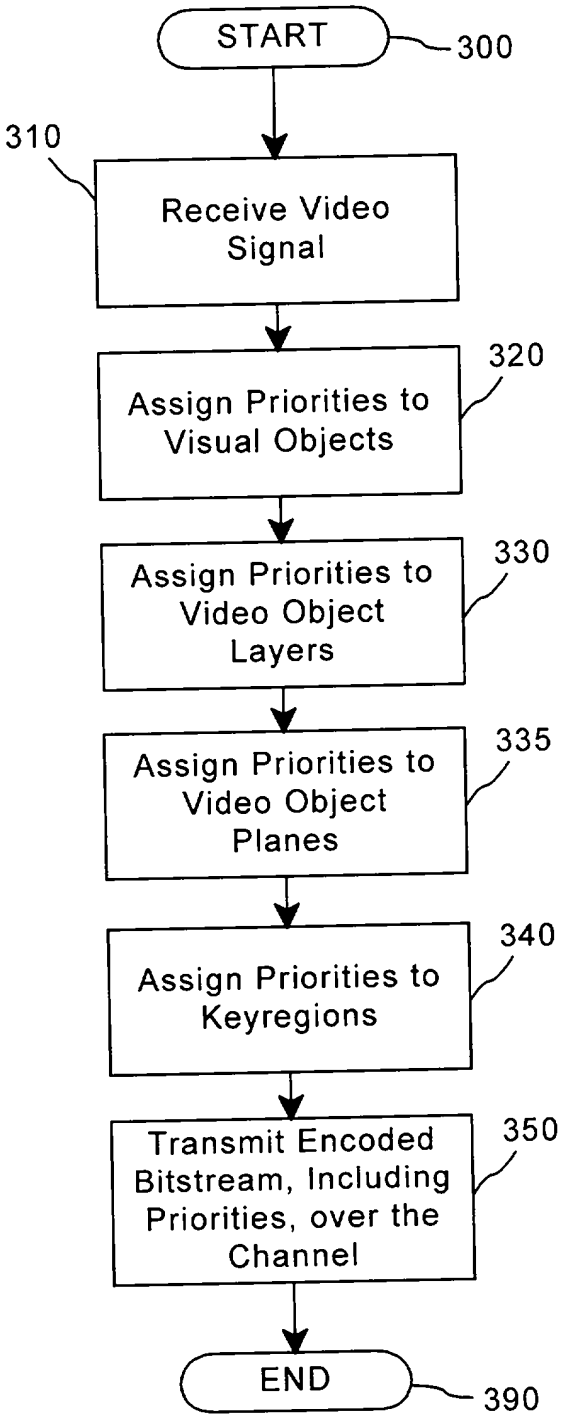
START
300
310
Receive Video Signal
320
Assign Priorities to Visual Objects
330
Assign Priorities to Video Object Layers
335
Assign Priorities to Video Object Planes
340
Assign Priorities to Keyregions
350
Transmit Encoded Bitstream, Including Priorities, over the Channel
END
390

FIG. 3

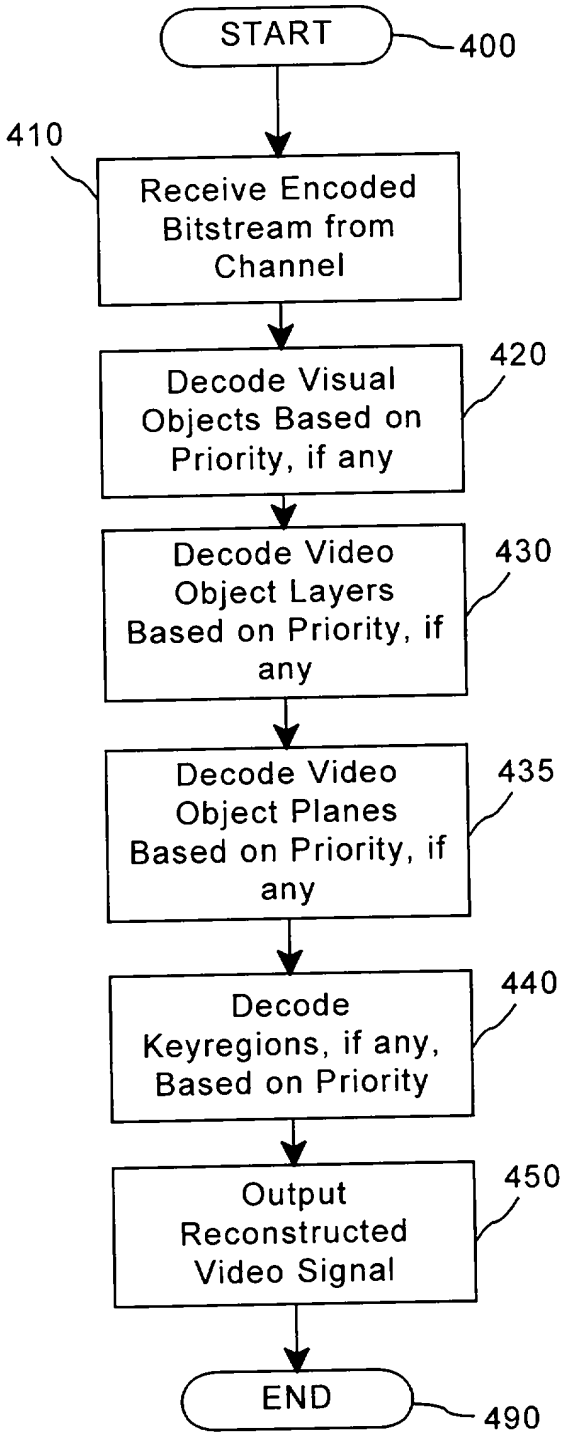
START
400
410
Receive Encoded Bitstream from Channel
420
Decode Visual Objects Based on Priority, if any
430
Decode Video Object Layers Based on Priority, if any
435
Decode Video Object Planes Based on Priority, if any
440
Decode Keyregions, if any, Based on Priority
450
Output Reconstructed Video Signal
END
490

FIG. 4

IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

Declaration and Power of Attorney

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled **Method And Apparatus To Prioritize Video Information During Coding And Decoding** the specification of which is attached hereto.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by an amendment, if any, specifically referred to in this oath or declaration.

I acknowledge the duty to disclose all information known to me which is material to patentability as defined in Title 37, Code of Federal Regulations, 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

None

I hereby claim the benefit under Title 35, United States Code, 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, 112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

None

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint the following attorney(s) with full power of substitution and revocation, to prosecute said application, to make alterations and amendments therein, to receive the patent, and to transact all business in the Patent and Trademark Office connected therewith:

Samuel H. Dworetsky	(Reg. No. 27873)
Thomas A. Restaino	(Reg. No. 33444)
Robert B. Levy	(Reg. No. 28234)
Michele Conover	(Reg. No. 34962)
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Please address all correspondence to Mr. S. H. Dworetsky, AT&T Corp., P. O. Box 4110, Middletown, New Jersey 07748. Telephone calls should be made to Thomas A. Restaino by dialing 908-903-6466.

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IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

PATENT APPLICATION

Barin Geoffry Haskell
Atul Puri
Robert Lewis Schmidt

Case 70-38-22

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Filed

Examiner

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ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D. C. 20231

SIR:

ASSOCIATE POWER OF ATTORNEY

Please recognize Frank Pietrantonio (Reg. No. 32289) and Patrick J. Buckley (Reg. No. 40928) of Kenyon & Kenyon as associate attorneys in the above-mentioned application, with full power to prosecute said application, to make alterations and amendments therein, and to transact all business in the Patent and Trademark Office connected therewith.

Notwithstanding the grant of associate power set forth herein, please direct all written correspondence in this application, as previously stated, to S. H. Dworetsky, AT&T Corp., P. O. Box 4110, Middletown, New Jersey 07748, and please direct all telephone calls in this application to Thomas A. Restaino at 908-903-6466.

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